REMARKS

This application has been carefully reviewed in light of the Office Action dated August 9, 2005. Claims 1, 2, 5 to 10, 12 to 18, 20 to 26, 28, 29, 31 to 43, 45, 46, 48 to 53, 55, 56, 58 to 63, 65, 66 and 68 to 71 remain in the application, with Claim 4 having been canceled herein. Claims 1, 9, 16, 24, 36 to 39, 42, 45, 48, 50, 55, 58, 60, 62, 65, 68 and 70 are the independent claims herein. Reconsideration and further examination are respectfully requested.

Claims 16, 20, 21, 23 and 38 were rejected under 35 U.S.C. § 102(b) over U.S. Patent No. 5,572,600 (Tajima), Claims 9, 12, 13, 15, 37, 45, 55 and 65 were rejected under 35 U.S.C. § 103(a) over Tajima in view of U.S. Patent No. 5,745,660 (Kolpatzik), Claim 14 was rejected under § 103(a) over Tajima in view of Kolpatzik and further in view of U.S. Patent No. 5,526,438 (Barton), Claim 18 was rejected under § 103(a) over Tajima in view of U.S. Patent No. 5,583,660 (Rylander), Claim 22 was rejected under § 103(a) over Tajima in view of Barton, Claims 10, 46, 56 and 66 were rejected under § 103(a) over Tajima in view of Kolpatzik and Rylander, Claims 1, 5, 6, 8, 36, 42, 52 and 62 were rejected under § 103(a0 over Tajima in view of Kolpatzik and further in view of U.S. Patent No. 5,543,941 (Parker), Claims 2, 43, 53 and 63 were rejected under § 103(a) over Tajima in view of Kolpatzik, Parker and Rylander, Claim 4 was rejected under § 103(a) over Tajima in view of Kolpatzik, Parker and U.S. Patent No. 5,832,122 (Shimazaki), Claim 7 was rejected under § 103(a) over Tajima in view of Kolpatzik, Parker and Barton, Claims 17, 48, 58 and 68 were rejected under § 103(a) over Tajima in view of Parker, Claims 49, 59 and 69 were rejected under § 103(a) over Tajima in view of Parker and Shimazaki, Claims 24 to 26, 28, 31 to 33, 35, 39 to 41, 50, 51, 60, 61, 70 and 71 were rejected under § 103(a) over Tajima in view of Shimazaki, Claim 34 was rejected under §

103(a) over Tajima in view of Shimazaki and Barton, and Claim 29 was rejected under § 103(a) over Tajima in view of Shimazaki and Rylander. Reconsideration and withdrawal of the rejections are respectfully requested.

One important aspect of the invention lies in the values of a dot pattern generated by a mask. According to this feature of the invention, a dot pattern generated by a mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

Referring specifically to the claims, amended independent Claim 1 is a method of reproducing gray levels to represent the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising the steps of providing non-blue noise properties for each respective gray level of a dot pattern generated in a pixel block of a standard size using the mask of a size corresponding to a size smaller than the standard size of the pixel block, and generating an output image with no moiré and/or certain repetitive pattern, when the input image undergoes a gray level reproducing process and the produced image is output by an output device, wherein said dot pattern generated by a mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

Amended independent Claims 36, 42, 52 and 62 are apparatus, apparatus, threshold matrix, and computer-readable storage medium claims, respectively, that substantially correspond to Claim 1.

Amended independent Claim 9 is similar to Claim 1, but is more specifically directed to a method of reproducing gray levels to represent the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising the steps of providing non-blue noise properties for each respective gray level of a dot pattern generated by the single mask, and generating an output image with no moiré and/or certain repetitive pattern when the input image undergoes a gray level reproducing process and the produced image is output by an output device, wherein the dot pattern generated by a mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

Amended independent Claims 37, 45, 55, and 65 are apparatus, apparatus, threshold matrix, and computer-readable storage medium claims, respectively, that substantially correspond to Claim 9.

Amended independent Claim 16 is a method of reproducing gray levels to represent the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising the steps of providing a plurality of isolated spectra for a two-dimensional spatial frequency spectrum of an individual dot pattern generated by a single mask at each respective gray level so that the dot pattern at each respective gray level has a non-blue noise property, and generating an output image with no moiré and/or certain repetitive pattern when the input image undergoes a gray level reproducing process and the produced image is output by an output device, wherein the dot pattern generated by a mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a

value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

Amended independent Claims 38, 48, 58, and 68 are apparatus, apparatus, threshold matrix, and computer-readable storage medium claims, respectively, that substantially correspond to Claim 16.

Amended independent Claim 24 is a method of representing the density of each pixel of an output image by binary or multivalue data based on a one-to-one correspondence of each pixel of an input image to each element of a threshold matrix (a mask), comprising the steps of composing the mask to have a size of an array of a plurality of element masks, each of which are a same size as that of a mask used in a dispersed-dot dithering method, and generating a dot pattern by the mask, the dot pattern comprising (1) at least a set of element pixel blocks, each of which corresponds to each element mask and has the same dot distribution at each respective gray level, (2) weak irregularity (perturbation) or pseudoperiodicity introduced at a certain gray level, (3) an equal number of dots in every element pixel block at each respective gray level, and (4) an equal number of dots in four individual partial element pixel blocks each having a quarter size of an element pixel block at each respective (4n)th (n indicates a positive integer) gray level, (5) having a non-blue noise property at each respective gray level, and (6) having a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

Amended independent Claims 39, 50, 60, and 70 are apparatus, apparatus, threshold matrix, and computer-readable storage medium claims, respectively, that substantially correspond to Claim 24.

The applied art, alone or in any permissible combination, is not seen to disclose or to suggest the features of the present invention. More particularly, the applied art is not seen to disclose or to suggest at least the feature of a dot pattern generated by a mask having a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

Tajima is merely seen to disclose a method for automatically generating a minimum unit of a threshold value of a digital halftone screen. Three type of orthogonal screens having different screen angles with respect to each other in a spatial frequency region are designed, and then the minimum unit of the threshold value is automatically generated in an image region. In columns 6 to 8 of Tajima, a halftone screen of approximately 15 degrees is represented in the spatial frequency region as follows:

$$\theta = \tan^{-1}(q / p) = 15\deg$$

where p and q are integers of 1 or more. Tajima discloses that orthogonal screens having the screen angles (θ) of +/- 15 degrees and 45 degrees, respectively, are superimposed on each other so that a rosette pattern can be generated having double circular rings in the spatial frequency region. However, Tajima is not seen to disclose or to suggest a dot pattern generated by a mask having a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

Kolpatzik is merely seen to disclose the use of quantization utilizing stochastic threshold arrays. The stochastic threshold arrays correspond to a dither matrix and points of the threshold array correspond to threshold values of the matrix. As described in column 6, within each stochastic threshold array group 24m, each threshold

array store 24m(n), in turn, stores one of the stochastic threshold arrays generated by the stochastic threshold array generation system 21 for the group's grain/mottle trade-off. Grain is an artifact caused by aggregated dots and mottle is an artifact caused by less aggregated or dispersed dots (see column 3). Therefore, "grain/mottle trade-off" in Kolpatzik merely means correlation between an aggregated/clustered-dot type stochastic threshold arrays and a dispersed-dot type stochastic threshold arrays. However, Kolpatzik is not seen to disclose or to suggest at least the feature of a dot pattern generated by a mask having a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

Parker is merely seen to disclose a method for rendering a halftone image of a gray scale image by utilizing a pixel-by-pixel comparison of the gray scale image against a blue noise mask. This method is for obtaining an image before quantized from a gray scale image (i.e., an image to which a halftone processing has already been applied). Thus, Parker discloses a blue noise mask and not a mask with non-blue noise properties. However, Parker is not seen to disclose or to suggest at least the feature of a dot pattern generated by a mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

Shimazaki is merely seen to disclose generating a halftone dot image of which tones are free from image degradation due to a dot gain. Shimazaki obtains a visual point spread function by applying a two-dimensional Fourier transform to visual spatial frequency characteristics (MTF). Then, applying the visual point spread function to positions corresponding to the positions of thresholds in order to determine a hypothetical

distribution of densities of an image produced by the thresholds. Finally, an unwanted granularity is reduced by establishing threshold matrices in order to minimize the variation of the hypothetical distribution of densities. However, Shimizaki is not seen to disclose or to suggest at least the feature of a dot pattern generated by a mask has a value equal to or greater than 1.2 dB as an average value of anisotropy and a value equal to or greater than 4 dB as a maximum value of anisotropy at each respective gray level.

The other applied references, namely Rylander and Barton, have been studied but are not seen to add anything that, when combined with any of Tajima, Kolpatzik, Parker, and Shimazaki, would have disclosed or suggested any of the foregoing features of the claimed invention.

In view of the foregoing amendments and remarks, the entire application is believed to be in condition for allowance and such action is respectfully requested at the Examiner's earliest convenience.

Applicant's undersigned attorney may be reached in our Costa Mesa, California office at (714) 540-8700. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,

Edward A. Kmett
Attorney for Applicant
Registration No.: 42,746

FITZPATRICK, CELLA, HARPER & SCINTO
30 Rockefeller Plaza
New York, New York 10112-2200
Facsimile: (212) 218-2200

CA_MAIN 106008v1